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## **Can small horticulture crops improve family farm incomes in mountains areas of Central America?**

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### **Resumen**

In mountains of Central America dietary is low diversity, energy intake is the 65% of the country average. The FAO and ONGs programs increased fruits and vegetables farms. Our question is if small horticulture crops can improve family farm incomes in mountain areas. Two locations of Nicaragua and Guatemala were studied. Semi-structured interviews and participatory rural appraisal has been done. Introduction of fruits and vegetables are focus on market to increase income and to get a better food supply. A dynamic model was developed using Vensim® to asses this question. The model allows impact evaluation of changes in work capacity, cultivated area, and introduction of vegetables on food security. The average family has seven members with a head of household of 42 years old, 32% have title of property over 3.6 ha included cropland and forest, and they are full time farmers. Annual family food production not always covers their nutritional needs. The 49% of households fall below the minimum daily energy level, established in 1770 kcal/person, the 33% did not intake of 40 g of protein/person, and 75% is below the optimal level of fat. After five years of farm to farm methodologies provided by ONGs to crop vegetables, results showed an increase of income, although the first and second years after change showed a loss of income. Horticulture increased family food cost supply from 357 to 668 €/year, but also increased incomes from 27 to 4485 €/year, results depend on market practices. Simulated farms with more than 0.23 ha devoted to staple crops are able to avoid shortfall periods. There is a maximum workload threshold placed at 1.7 ha for a two farmer's family. Simulations showed that implementing 0.33 ha of tomato (19% of manageable area) will amount Guatemalan minimum wage incomes. Small family farm in mountain areas can found in horticulture one alternative to increase incomes. Horticulture crop required more labour and increased the land intensification. Market of production will be the key factor in the future of this family farms.

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